

## **Chapter 3.2 INDIVIDUAL RIVER BASIN DESCRIPTION and ASSESSMENTS**

### **Potomac and Shenandoah River Basin**

The Potomac-Shenandoah River Basin, as its name implies, is made up of the Shenandoah River Subbasin and the Potomac River Subbasin. It occupies the northern portion of Virginia and covers 5,747 square miles or 14 percent of the Commonwealth's total area.

In Virginia, the Potomac-Shenandoah basin is defined by both hydrologic and political boundaries. The James River, Rappahannock River, and York River Basins bound the basin to the west and south. The West Virginia and Maryland State lines and the District of Columbia bound the northern and eastern perimeter of the basin.

The Shenandoah River Subbasin headwaters begin in Augusta County and flow in a northeasterly direction for approximately 100 miles to the West Virginia State line. The basin averages 30 miles in width and covers 2,926 square miles.

The topography of the Shenandoah River Subbasin is characterized by rolling hills and valleys bordered by the Appalachian Mountains to the west and the Blue Ridge Mountains to the east. The Massanutten Mountain Range divides the Shenandoah River into the North and South Forks. Tributaries of the Shenandoah River exhibit steep profiles as they drain the surrounding mountain ridge. The main stems of the Shenandoah exhibit a moderately sloping profile with occasional riffles and pools. 45 percent of the land is forested due to the large amount of federally owned land and the steep topography. Farmland and pasture account for 39 percent of the land area, while 16 percent is urban.

The Potomac River Subbasin headwaters begin in Highland County. The drainage area is 323 square miles for the headwaters. The river then flows in a northeasterly direction through West Virginia and Maryland before joining the Shenandoah at Harper's Ferry, West Virginia. The Potomac continues as the border between Maryland and Virginia. These waters flow approximately 200 miles in a southeasterly direction through Loudoun and Fauquier Counties to eventually Westmoreland County. Approximately 2,821 of the 14,700 square miles of the Potomac River Subbasin drainage area lie in Virginia. The rest covers four states and the District of Columbia.

Gently sloping hills and valleys from Harpers Ferry to approximately 45 miles down river characterize the topography of the upper Piedmont region of the Potomac River Subbasin. In the central Piedmont area, the profile is rather flat until it nears the fall line at Great Falls, where the stream elevation rapidly descends from over 200 feet to sea level. Tributaries in the central Piedmont exhibit moderate and near constant profiles. Their flat slope largely characterizes streams in the Coastal Plain area. Approximately 40 percent of the Potomac River Basin is forested, 33 percent is farmland and pasture and an estimated 27 percent is urban.

The 2006 population for the Potomac-Shenandoah River Basin was approximately 2,599,963. The majority of the population resides in urban Virginia surrounding Washington, D.C. All or part of the following jurisdictions lie within the basin: Counties – Arlington, Augusta, Clarke, Fairfax, Fauquier, Frederick, Highland, King George, Loudoun, Northumberland, Page, Prince William, Rockingham, Shenandoah, Stafford, Warren, and Westmoreland; Cities – Alexandria, Fairfax, Falls Church, Harrisonburg, Manassas, Manassas Park, Staunton, Waynesboro, and Winchester.

The Potomac-Shenandoah River Basin is divided into eight USGS hydrologic units as follows: HUC 02070001 - South Branch Potomac; HUC 02070004 - Conococheague-Opequon; HUC 02070005 - South Fork Shenandoah; HUC 02070006 - North Fork Shenandoah; HUC 02070007 - Shenandoah; HUC 02070008 - Middle Potomac-Catoctin; HUC 02070010 - Middle Potomac-Anacostia-Occoquan; HUC 02070011 - Lower Potomac. The eight hydrologic units are further divided into 87 waterbodies or watersheds.

Basin assessment information is included in Tables 3.2-1-1, 3.2-1-2, 3.2-1-3.

Table 3.2-1-1

## POTOMAC-SHENANDOAH RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

Basin Size: *All Sizes Rounded to Nearest Whole Number*

Rivers - 5,834 miles

Lakes - 3,946 acres

Estuaries - 59 sq. miles

Designated Use	Water Body Type	Fully Supporting	Total Impaired	Naturally Impaired	Insufficient Information	Not Assessed	Total Assessed
Aquatic Life	River (mi)	1,639	876	58	194	3,125	2,515
	Lakes (acres)	521	1,604	36	0	1,821	2,125
	Estuary (sq. mi.)	22	37	0	0	0	59
Fish Consumption	River (mi)	220	212	0	79	5,323	431
	Lakes (acres)	110	102	0	0	3,734	212
	Estuary (sq. mi.)	7	30	0	0	22	37
Public Water Supply	River (mi)	235	2	0	0	1,683	237
	Lakes (acres)	270	0	0	0	3,218	270
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Recreation	River (mi)	595	1,362	0	158	3,718	1,957
	Lakes (acres)	675	0	0	11	3,260	675
	Estuary (sq. mi.)	10	7	0	0	42	17
Shellfishing	River (mi)	NA	NA	NA	NA	NA	NA
	Lakes (acres)	NA	NA	NA	NA	NA	NA
	Estuary (sq. mi.)	21	12	0	0	1	33
Wildlife	River (mi)	2,204	0	0	12	3,618	2,204
	Lakes (acres)	697	0	0	0	3,249	697
	Estuary (sq. mi.)	30	1	0	0	28	31

## Chesapeake Bay Designated Uses

Open Water Aquatic Life Use	Estuary (sq. mi.)	27	32	0	0	0	59
Deep Water Aquatic Life Use	Estuary (sq. mi.)	12	0	0	0	0	12
Deep Channel Aquatic Life Use	Estuary (sq. mi.)	0	0	0	0	2	0
Shallow Water Use	Estuary (sq. mi.)	24	35	0	0	0	59
Migratory Spawning and Nursery	Estuary (sq. mi.)	0	0	0	0	30	0

**TABLE 3.2-1-2 WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE CATEGORIES IN POTOMAC-SHENANDOAH BASIN**

<i>Pollutant</i>	<i>Type</i>	<b>Impaired (Rounded to Nearest Whole Number)</b>
<b>Aquatic Plants (Macrophytes)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	35
<b>General Standards (Benthics)</b>	River (mi)	563
	Lakes (acres)	0
	Estuary (sq. mi.)	1
<b>Benzo(k)fluoranthene</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1
<b>Chlordane</b>	River (mi)	2
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Chloride</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1
<b>Dissolved Oxygen</b>	River (mi)	80
	Lakes (acres)	1,422
	Estuary (sq. mi.)	32
<b>Escherichia coli Pathogen Indicator</b>	River (mi)	1,047
	Lakes (acres)	0
	Estuary (sq. mi.)	4
<b>Enterococcus Pathogen Indicator</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	3
<b>Fecal Coliform Pathogen Indicator</b>	River (mi)	789
	Lakes (acres)	0
	Estuary (sq. mi.)	13
<b>Heptachlor Epoxide</b>	River (mi)	5
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Nitrate</b>	River (mi)	2
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Mercury in Fish Tissue</b>	River (mi)	156
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>PCB in Fish Tissue</b>	River (mi)	96
	Lakes (acres)	102
	Estuary (sq. mi.)	30
<b>pH</b>	River (mi)	235
	Lakes (acres)	240
	Estuary (sq. mi.)	1
<b>Temperature</b>	River (mi)	72
	Lakes (acres)	99
	Estuary (sq. mi.)	0

**TABLE 3.2-1-3 WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES IN POTOMAC-SHENANDOAH BASIN**

<i>Source of Impairment</i>	<i>Type</i>	<i>Impaired (Rounded to Nearest Whole Number)</i>
<b>Agriculture</b>	River (mi)	537
	Lakes (acres)	0
	Estuary (sq. mi.)	35
<b>Aquaculture</b>	River (mi)	2
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Atmospheric Deposition (Acidity)</b>	River (mi)	171
	Lakes (acres)	182
	Estuary (sq. mi.)	0
<b>Atmospheric Deposition (Nitrogen)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	35
<b>Atmospheric Deposition (Toxics)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	4
<b>Channelization/Upstream Hydromodification</b>	River (mi)	14
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Clean Sediments</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	35
<b>Combined Sewer Overflows</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1
<b>Commercial Districts (Industrial Parks)</b>	River (mi)	3
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Contaminated Sediments</b>	River (mi)	169
	Lakes (acres)	0
	Estuary (sq. mi.)	4
<b>Drought Related</b>	River (mi)	12
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Dry Crop Land</b>	River (mi)	5
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Grazing in Riparian or Shoreline Zones</b>	River (mi)	140
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Illicit Connections/Hookups to Storm Sewers</b>	River (mi)	13
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Impervious Surfaces</b>	River (mi)	5
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Inappropriate Waste Disposal</b>	River (mi)	10
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Industrial Point Sources</b>	River (mi)	12
	Lakes (acres)	0
	Estuary (sq. mi.)	35
<b>Internal Nutrient Recycling</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	35

<b>Source of Impairment</b>	<b>Type</b>	<b>Impaired (Rounded to Nearest Whole Number)</b>
<b>Land Application of Waste</b>	River (mi)	27
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Land Development/Site Clearance</b>	River (mi)	5
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Lake Fertilization</b>	River (mi)	2
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Livestock (Grazing or Feeding Operations)</b>	River (mi)	105
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Loss of Riparian Habitat</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	35
<b>Manure Runoff</b>	River (mi)	35
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Municipal Point Sources</b>	River (mi)	8
	Lakes (acres)	0
	Estuary (sq. mi.)	35
<b>Municipal (Urbanized Area)</b>	River (mi)	132
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Natural Conditions</b>	River (mi)	0
	Lakes (acres)	36
	Estuary (sq. mi.)	1
<b>Natural Conditions-Water Quality Use Attainability</b>	River (mi)	119
	Lakes (acres)	1,328
	Estuary (sq. mi.)	0
<b>Non-Point Source</b>	River (mi)	839
	Lakes (acres)	0
	Estuary (sq. mi.)	9
<b>Rangeland Grazing</b>	River (mi)	11
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Runoff from Forest/Grassland/Parks</b>	River (mi)	38
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Sediment Resuspension</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	35
<b>Sewage Discharge in Unsewered Areas</b>	River (mi)	110
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Source Outside of Jurisdiction</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	35
<b>Source Unknown</b>	River (mi)	588
	Lakes (acres)	260
	Estuary (sq. mi.)	33
<b>Streambank Modification</b>	River (mi)	10
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Upstream Impoundment</b>	River (mi)	9
	Lakes (acres)	0
	Estuary (sq. mi.)	0

<b><i>Source of Impairment</i></b>	<b><i>Type</i></b>	<b><i>Impaired (Rounded to Nearest Whole Number)</i></b>
<b>Urban Runoff/Municipal Storm Sewer (MS4)</b>	River (mi)	12
	Lakes (acres)	0
	Estuary (sq. mi.)	3
<b>Wastes from Pets</b>	River (mi)	55
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Waterfowl</b>	River (mi)	114
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Wildlife other than Waterfowl</b>	River (mi)	947
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Wet Weather Discharge</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	35

## **James River Basin**

The James River Basin occupies the central portion of Virginia and covers 10,206 square miles or approximately 25 percent of the Commonwealth's total land area. It is Virginia's largest river basin and is made up of the Upper, Middle, and Lower James River Subbasins and the Appomattox River Subbasin.

The James River Basin is defined by both hydrologic and political boundaries. The Potomac-Shenandoah River Basin, the Rappahannock River Basin and the York River Basins bound the basin to the north. The southern boundary is made up of the New River Basin, the Roanoke River Basin and the Chowan River Basin. Its headwaters originate along the Virginia/West Virginia state line.

The James River Basin begins in the Alleghany Mountains and flows in a southeasterly direction to Hampton Roads where it enters the Chesapeake Bay. The James is formed by the confluence of the Jackson and Cowpasture Rivers and flows 228 miles to the Fall Line at Richmond and another 111 miles to the Chesapeake Bay.

The topography of the James River Basin varies throughout the four physiographic provinces that it spans. The Valley and Ridge Province extends from the Appalachian Plateau in West Virginia to the Blue Ridge Province. This province is dominated by narrow ridges and valleys running in a northeast/southwest direction, turning into a broad valley with low, rounded hills in the extreme southeast section of the province. The Blue Ridge Province, a remnant of a former highland, differs from the Valley and Ridge Province to the Fall Line. The western section of the Piedmont has scattered hills and small mountains, gradually turning into gently rolling slopes and lower elevation in the eastern Piedmont Province. The Fall Zone separates the Coastal Plain Province from the Piedmont. The Fall Zone is a three-mile stretch of river running through Richmond where the river descends 84 feet as it flows from the resistant rocks of the Piedmont to the softer sediments of the Coastal Plain.

Over 65 percent of the James River Basin is forested, with 19 percent in cropland and pasture. Approximately 12 percent is considered urban. The 2006 population for the James River Basin was approximately 2,092,278. This population is concentrated in two metropolitan areas: Tidewater, with over one million people, and the Greater Richmond – Petersburg area with over 650,000. Two smaller population centers are the Lynchburg and Charlottesville areas, each with over 100,000 people. All or portions of the following 38 counties and 15 cities lie within the basin: counties - Albemarle, Alleghany, Amelia, Amherst, Appomattox, Augusta, Bath, Bedford, Botetourt, Buckingham, Campbell, Charles City, Chesterfield, Craig, Cumberland, Dinwiddie, Fluvanna, Giles, Goochland, Greene, Hanover, Henrico, Highland, Isle of Wight, James City, Louisa, Montgomery, Nelson, New Kent, Nottoway, Orange, Portsmouth, Powhatan, Prince Edward, Prince George, Roanoke, Rockbridge, Surry, and York; cities - Buena Vista, Charlottesville, Clifton Forge, Colonial Heights, Covington, Hopewell, Lexington, Lynchburg, Newport News, Norfolk, Petersburg, Richmond, Suffolk, Williamsburg, and Virginia Beach.

Average annual precipitation is 42.5 inches. Average annual snowfall amount ranges from over 30 inches in the mountains to less than 10 inches along the coast.

Major tributaries to the James River are Jackson River, Cowpasture River, Craig Creek, Maury River, Tye River, Rockfish River, Slate River, Rivanna River, Willis River, Appomattox River, Chichahominy River, Pagan River, Nansemond River, and the Elizabeth River.

The James River Basin is divided into seven USGS hydrologic units as follows: HUC 02080201 – Upper James, HUC 02080202 – the Maury, HUC 02080203 – Upper Middle James, HUC 02080204 – the Rivanna, HUC 02080205 – the Lower Middle James, HUC 02080206 – Lower James, HUC 02080207 – the Appomattox, and HUC 02080208 – the Elizabeth. The nine hydrologic units are further divided into 92 waterbodies or watersheds.

Basin assessment information is presented in Tables 3.2-2-1, 3.2-2-2, 3.2-2-3.

TABLE 3.2-2-1

## JAMES RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

**Basin Size: All Sizes Rounded to Nearest Whole Number**

Rivers - 12,944 miles

Lakes - 18,301 acres

Estuaries - 265 sq. miles

Designated Use	Water Body Type	Fully Supporting	Total Impaired	Naturally Impaired	Insufficient Information	Not Assessed	Total Assessed
Aquatic Life	River (mi)	3,123	727	191	275	8,820	3,849
	Lakes (acres)	8,378	9,879	57	0	43	18,258
	Estuary (sq. mi.)	0	261	0	4	0	261
Fish Consumption	River (mi)	1,428	244	0	0	11,272	1,672
	Lakes (acres)	10,037	1,110	0	0	7,155	11,147
	Estuary (sq. mi.)	8	247	0	10	0	255
Public Water Supply	River (mi)	368	0	0	0	1,076	368
	Lakes (acres)	7,668	0	0	0	5,193	7,668
	Estuary (sq. mi.)	6	0	0	0	1	6
Recreation	River (mi)	1,432	1,638	0	132	9,742	3,070
	Lakes (acres)	13,476	88	0	817	3,920	13,564
	Estuary (sq. mi.)	196	38	0	13	18	234
Shellfishing	River (mi)	NA	NA	NA	NA	NA	NA
	Lakes (acres)	NA	NA	NA	NA	NA	NA
	Estuary (sq. mi.)	102	11	0	0	0	114
Wildlife	River (mi)	3,268	1	0	0	9,675	3,269
	Lakes (acres)	17,868	290	0	0	143	18,158
	Estuary (sq. mi.)	54	18	0	1	191	73

## Chesapeake Bay Designated Use

Open Water Aquatic Life Use	Estuary (sq. mi.)	4	256	0	4	0	261
Deep Water Aquatic Life Use	Estuary (sq. mi.)	0	2	0	0	0	2
Deep Channel Aquatic Life Use	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Shallow Water Use	Estuary (sq. mi.)	157	89	0	0	0	246
Migratory Spawning and Nursery	Estuary (sq. mi.)	0	0	0	2	212	0



**TABLE 3.2-2-2 WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE CATEGORIES IN JAMES BASIN**

<i>Pollutant</i>	<i>Type</i>	<i>Impaired (Rounded to Nearest Whole Number)</i>
<b>General Standards (Benthics)</b>	River (mi)	253
	Lakes (acres)	0
	Estuary (sq. mi.)	67
<b>Aquatic Plants (Macrophytes)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	89
<b>Aldrin</b>	River (mi)	6
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Ammonia</b>	River (mi)	1
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Chloride</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	48
<b>Chlorophyll a</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	202
<b>Copper</b>	River (mi)	0
	Lakes (acres)	290
	Estuary (sq. mi.)	0
<b>Dissolved Oxygen</b>	River (mi)	261
	Lakes (acres)	9,625
	Estuary (sq. mi.)	225
<b>Enterococcus Pathogen Indicators</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	16
<b>Escherichia coli Pathogen Indicators</b>	River (mi)	1,410
	Lakes (acres)	88
	Estuary (sq. mi.)	22
<b>Fecal Coliform Pathogen Indicators</b>	River (mi)	372
	Lakes (acres)	0
	Estuary (sq. mi.)	11
<b>Mercury in Fish Tissue</b>	River (mi)	0
	Lakes (acres)	1,110
	Estuary (sq. mi.)	0
<b>PCB in Fish Tissue</b>	River (mi)	244
	Lakes (acres)	0
	Estuary (sq. mi.)	247
<b>pH</b>	River (mi)	240
	Lakes (acres)	380
	Estuary (sq. mi.)	0
<b>Temperature</b>	River (mi)	107
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Tributyltin (TBT)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	11

**TABLE 3.2-2-3 WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES IN JAMES RIVER BASIN**

<i><b>Source of Impairment</b></i>	<i><b>Type</b></i>	<i><b>Impaired (Rounded to Nearest Whole Number)</b></i>
<b>Aquaculture</b>	River (mi)	1
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Agriculture</b>	River (mi)	451
	Lakes (acres)	0
	Estuary (sq. mi.)	236
<b>Atmospheric Deposition (Toxics)</b>	River (mi)	0
	Lakes (acres)	1,110
	Estuary (sq. mi.)	0
<b>Atmospheric Deposition (Acidity)</b>	River (mi)	16
	Lakes (acres)	217
	Estuary (sq. mi.)	0
<b>Atmospheric Deposition (Nitrogen)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	236
<b>Changes in Ordinary Stratification and Bottom Water Anoxia</b>	River (mi)	0
	Lakes (acres)	366
	Estuary (sq. mi.)	0
<b>Clean Sediment/Sediment Resuspension</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	89
<b>Contaminated Sediment</b>	River (mi)	23
	Lakes (acres)	0
	Estuary (sq. mi.)	24
<b>Combined Sewer Overflows</b>	River (mi)	50
	Lakes (acres)	0
	Estuary (sq. mi.)	7
<b>Discharges from Municipal Storm Sewers (MS4)</b>	River (mi)	40
	Lakes (acres)	0
	Estuary (sq. mi.)	14
<b>Drought Related Impacts</b>	River (mi)	16
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Dam or Impoundment</b>	River (mi)	12
	Lakes (acres)	306
	Estuary (sq. mi.)	0
<b>Grazing in Riparian Zone</b>	River (mi)	21
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Impacts from Abandoned Mine Lands</b>	River (mi)	6
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Industrial Point Sources</b>	River (mi)	69
	Lakes (acres)	0
	Estuary (sq. mi.)	261
<b>Internal Nutrient Recycling</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	236
<b>Landfills</b>	River (mi)	2
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Loss of Riparian Habitat</b>	River (mi)	12
	Lakes (acres)	0
	Estuary (sq. mi.)	236
<b>Livestock Grazing</b>	River (mi)	207
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Mine Tailings</b>	River (mi)	6
	Lakes (acres)	0
	Estuary (sq. mi.)	0

<i>Source of Impairment</i>	<i>Type</i>	<i>Impaired (Rounded to Nearest Whole Number)</i>
<b>Municipal Point Sources</b>	River (mi)	115
	Lakes (acres)	0
	Estuary (sq. mi.)	261
<b>Municipal (Urbanized High Density Areas)</b>	River (mi)	63
	Lakes (acres)	290
	Estuary (sq. mi.)	0
<b>Natural Conditions – Water Quality Use Attainability</b>	River (mi)	306
	Lakes (acres)	60
	Estuary (sq. mi.)	48
<b>Natural Sources</b>	River (mi)	3
	Lakes (acres)	57
	Estuary (sq. mi.)	0
<b>Non-Point Source</b>	River (mi)	862
	Lakes (acres)	88
	Estuary (sq. mi.)	204
<b>On-site Treatment Systems</b>	River (mi)	92
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Other Shipping Releases</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	11
<b>Sanitary Sewer Overflows</b>	River (mi)	5
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Sediment Resuspension (Clean Sediment)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	89
<b>Silviculture Harvesting</b>	River (mi)	1
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Source Unknown</b>	River (mi)	1,006
	Lakes (acres)	10,598
	Estuary (sq. mi.)	250
<b>Shipbuilding/Drydock and Ship Repairs</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	11
<b>Source Outside of Jurisdiction</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	235
<b>Upstream Impoundments</b>	River (mi)	1
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Unspecified Domestic Waste</b>	River (mi)	148
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Urban Runoff &amp; Storm Sewers</b>	River (mi)	33
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Wildlife other than Waterfowl</b>	River (mi)	646
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Waste from Pets</b>	River (mi)	136
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Wet Weather (Point Source)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	236
<b>Wet Weather (Non Point Source)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	178

## **Rappahannock River Basin**

The Rappahannock River Basin is located in the northeastern portion of Virginia and covers 2,715 square miles or approximately 6.8 percent of the Commonwealth's total area.

The Rappahannock River Basin is bordered by the Potomac-Shenandoah Basin to the north and the York River Basin and Coastal Basin to the south. The headwaters lie in Fauquier and Rappahannock Counties and flow in a southeasterly direction to its mouth, where it enters the Chesapeake Bay between Lancaster and Middlesex Counties. The Rappahannock River Basin is 184 miles in length and varies in width from 20 to 50 miles. The Rappahannock River Basin's major tributaries are the Hazel River, Thornton River, Mountain Run, Rapidan River, Robinson River, Cat Point Creek, and the Corotoman River.

The topography of the Rappahannock River Basin changes from steep to flat as it flows from the Blue Ridge Mountains to the Chesapeake Bay. About 51 percent of the basin land is forest, while pasture and cropland make up another 36 percent. Only about 6 percent of the land area is considered urban.

Most of the Rappahannock River Basin lies in the eastern Piedmont and Tidewater areas of the Commonwealth while its headwaters, located on the eastern slopes of the Blue Ridge, are considered to be in the northern and western Piedmont section.

The 2006 population of the Rappahannock River Basin was approximately 294,576. The basin is mostly rural in character with no large population centers. However, the basin has seeing increasing urban pressure from the influence of metropolitan Washington in the Fredericksburg and Fauquier areas of the basin. All or portions of the following 16 counties and one city lie within the Basin: Albemarle, Caroline, Culpeper, Essex, Fauquier, Greene, King George, Lancaster, Madison, Middlesex, Orange, Rappahannock, Richmond, Spotsylvania, Stafford, and Westmoreland; Cities- Fredericksburg.

The Rappahannock River Basin is divided into two USGS hydrologic units as follows: HUC 02080103 – Rapidan – Upper Rappahannock; and HUC 02080104 – Lower Rappahannock.

Basin assessment information is presented in Tables 3.2-3-1, 3.2-3-2, 3.2-3-3.

TABLE 3.2-3-1

## RAPPAHANNOCK RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

**Basin Size: All Sizes Rounded to Nearest Whole Number**

Rivers - 2,806 miles

Lakes - 974 acres

Estuaries - 155 sq. miles

Designated Use	Water Body Type	Fully Supporting	Total Impaired	Naturally Impaired	Insufficient Information	Not Assessed	Total Assessed
Aquatic Life	River (mi)	523	267	149	122	1,894	789
	Lakes (acres)	515	460	0	0	0	974
	Estuary (sq. mi.)	1	153	1	0	0	155
Fish Consumption	River (mi)	115	28	0	52	2,611	143
	Lakes (acres)	23	189	0	0	762	212
	Estuary (sq. mi.)	9	129	0	0	16	138
Public Water Supply	River (mi)	8	0	0	4	576	8
	Lakes (acres)	825	0	0	0	74	825
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Recreation	River (mi)	114	370	0	44	2,279	483
	Lakes (acres)	577	0	0	0	398	577
	Estuary (sq. mi.)	122	12	0	0	21	133
Shellfishing	River (mi)	NA	NA	NA	NA	NA	NA
	Lakes (acres)	NA	NA	NA	NA	NA	NA
	Estuary (sq. mi.)	103	20	0	0	9	123
Wildlife	River (mi)	637	0	0	4	2,165	637
	Lakes (acres)	899	0	0	0	75	899
	Estuary (sq. mi.)	80	59	0	0	16	138

## Chesapeake Bay Designated Uses

Open-Water Aquatic Life	Estuary (sq. mi.)	8	147	0	0	0	155
Deep-Water Aquatic Life	Estuary (sq. mi.)	0	83	0	0	0	83
Deep-Channel Seasonal Refuge	Estuary (sq. mi.)	0	66	0	0	0	66
Shallow-Water Submerged Aquatic Vegetation	Estuary (sq. mi.)	22	133	0	0	0	155
Migratory Fish Spawning and Nursery	Estuary (sq. mi.)	0	0	0	0	54	0

**TABLE 3.2-3-2 WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE CATEGORIES IN RAPPAHANNOCK BASIN**

<i>Pollutant</i>	<i>Type</i>	<i>Impaired (Rounded to Nearest Whole Number)</i>
<b>Aquatic Plants (Macrophytes)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	133
<b>Chloride</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	59
<b>Benthic Assessment</b>	River (mi)	29
	Lakes (acres)	0
	Estuary (sq. mi.)	114
<b>Dissolved Oxygen</b>	River (mi)	87
	Lakes (acres)	322
	Estuary (sq. mi.)	147
<b>E. coli Pathogen Indicators</b>	River (mi)	332
	Lakes (acres)	0
	Estuary (sq. mi.)	9
<b>Enterococcus Pathogen Indicators</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1
<b>Fecal Coliform Pathogen Indicators</b>	River (mi)	38
	Lakes (acres)	0
	Estuary (sq. mi.)	20
<b>Mercury in Fish Tissue</b>	River (mi)	0
	Lakes (acres)	189
	Estuary (sq. mi.)	0
<b>PCB in Fish Tissue</b>	River (mi)	28
	Lakes (acres)	0
	Estuary (sq. mi.)	129
<b>pH</b>	River (mi)	228
	Lakes (acres)	387
	Estuary (sq. mi.)	1
<b>Sediment Bioassays for Estuarine Waters</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1
<b>Temperature</b>	River (mi)	8
	Lakes (acres)	0
	Estuary (sq. mi.)	0

**TABLE 3.2-3-2 WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES  
IN RAPPAHANNOCK BASIN**

<i>Source of Impairment</i>	<i>Type</i>	<i>Impaired (Rounded to Nearest Whole Number)</i>
<b>Agriculture</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	147
<b>Atmospheric Deposition (Nitrogen)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	147
<b>Atmospheric Deposition (Toxics)</b>	River (mi)	0
	Lakes (acres)	52
	Estuary (sq. mi.)	0
<b>Clean Sediments</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	133
<b>Forest/Grassland Runoff</b>	River (mi)	84
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Grazing in Riparian Zone</b>	River (mi)	84
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Impacts from Land Application of Wastes</b>	River (mi)	50
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Impervious Surfaces</b>	River (mi)	7
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Industrial Point Sources</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	147
<b>Internal Nutrient Recycling</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	147
<b>Loss of Riparian Habitat</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	147
<b>Livestock Grazing or Feeding/Riparian Zones</b>	River (mi)	84
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Manure Runoff</b>	River (mi)	7
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Municipal Point Sources</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	147
<b>Natural Conditions – Water Quality Use Attainability</b>	River (mi)	223
	Lakes (acres)	322
	Estuary (sq. mi.)	59
<b>Non Point Source</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	5
<b>Sediment Resuspension</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	133

<b>Source of Impairment</b>	<b>Type</b>	<b>Impaired (Rounded to Nearest Whole Number)</b>
<b>Sewage Discharge in Unsewered Areas</b>	River (mi)	84
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Source Unknown</b>	River (mi)	323
	Lakes (acres)	189
	Estuary (sq. mi.)	140
<b>Sources Outside of Jurisdiction</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	147
<b>Wet Weather Discharges (Point Source)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	147
<b>Waste from Pets</b>	River (mi)	69
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Waterfowl</b>	River (mi)	84
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Wildlife other than Waterfowl</b>	River (mi)	84
	Lakes (acres)	0
	Estuary (sq. mi.)	0



## **Roanoke River Basin**

The Roanoke River Basin covers 6,382 square miles or approximately 16 percent of the Commonwealth's total area. In addition to the Roanoke itself, the basin also contains the Ararat River Subbasin.

The Virginia portion of the Roanoke River Basin is defined by both hydrologic and political boundaries. The basin is bound by the James River Basin on the east, to the north by the Chowan River Basin, and to the west by the New River Basin. The southern boundary of the basin is the Virginia/North Carolina State line.

The topography of the Roanoke River Basin ranges from steep slopes and valleys in the Valley and Ridge Province to gently sloping terrain east of the mountains in the Piedmont Province.

The Roanoke River Basin headwaters begin in the mountainous terrain of eastern Montgomery County and flow in a southeasterly direction to the Virginia/North Carolina State line. The Roanoke Basin passes through three physiographic provinces- the Valley and Ridge Province to the northwest, and the Blue Ridge and Piedmont Provinces to the southeast.

The Roanoke watershed is large enough to accommodate two major reservoirs, Smith Mountain and Leesville Lakes to the north and Kerr Reservoir and Lake Gaston located at the junction of the Roanoke River and the North Carolina state line. These reservoirs range in size from the 49,000 acre Kerr Reservoir to the 3,400 acre Leesville Lake. These impoundments are used for both recreation and hydroelectricity. Major tributaries in the northern section of the basin are the Little Otter and Big Otter Rivers along with the Blackwater and Pigg Rivers. Major tributaries in the southern portion include the Dan River, Smith River, and Banister River. Over 62 percent of the Roanoke River Basin is forested, while nearly 25 percent is in cropland and pasture. Approximately 10 percent is considered urban.

The 2006 population for the Roanoke River Basin was approximately 690,497. All or portions of the following sixteen counties and five cities lie within the basin: counties – Appomattox, Bedford, Botetourt, Brunswick, Campbell, Carroll, Charlotte, Floyd, Franklin, Halifax, Henry, Mecklenburg, Montgomery, Patrick, Pittsylvania, and Roanoke; cities – Bedford, Danville, Martinsville, Roanoke, and Salem.

The Roanoke River Basin is divided into six USGS hydrologic units as follows: HUC 03010101 – Upper Roanoke; HUC 03010102 – Middle Roanoke; HUC 03010103 – Upper Dan; HUC 03010104 – Lower Dan; HUC 03010105 – Banister, and HUC 03010106 – Roanoke Rapids.

Basin assessment information is presented in Tables 3.2-4-1, 3.2-4-2, 3.2-4-3.

TABLE 3.2-4-1

## ROANOKE RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY

**Basin Size: All Sizes Rounded to Nearest Whole Number**

Rivers - 9,340 miles

Lakes - 66,384 acres

Estuaries - 0 sq. miles

Designated Use	Water Body Type	Fully Supporting	Total Impaired	Naturally Impaired	Insufficient Information	Not Assessed	Total Assessed
Aquatic Life	River (mi)	1,843	337	34	89	7,071	2,179
	Lakes (acres)	25,725	39,111	0	36	1,512	64,836
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Fish Consumption	River (mi)	274	230	0	38	8,798	504
	Lakes (acres)	5,086	57,556	0	389	3,354	62,642
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Public Water Supply	River (mi)	766	0	0	15	3,394	766
	Lakes (acres)	61,351	0	0	0	1,905	61,351
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Recreation	River (mi)	463	1,476	0	159	7,242	1,939
	Lakes (acres)	58,952	4,839	0	181	2,413	63,790
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Shellfishing	River (mi)	NA	NA	NA	NA	NA	NA
	Lakes (acres)	NA	NA	NA	NA	NA	NA
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Wildlife	River (mi)	1,906	0	0	22	7,412	1,906
	Lakes (acres)	63,576	0	0	0	2,808	63,576
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA

**TABLE 3.2-4-2 WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE CATEGORIES IN ROANOKE BASIN**

<i><b>Pollutant</b></i>	<i><b>Type</b></i>	<i><b>Impaired (Rounded to Nearest Whole Number)</b></i>
<b>Benthic Assessment</b>	River (mi)	201
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>DDE/DDT</b>	River (mi)	10
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Dissolved Oxygen</b>	River (mi)	35
	Lakes (acres)	39,111
	Estuary (sq. mi.)	-
<b>Escherichia coli Pathogen Indicators</b>	River (mi)	1,268
	Lakes (acres)	4,839
	Estuary (sq. mi.)	-
<b>Fecal Coliform Pathogen Indicators</b>	River (mi)	245
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>PCB in Fish Tissue</b>	River (mi)	230
	Lakes (acres)	57,556
	Estuary (sq. mi.)	-
<b>pH</b>	River (mi)	30
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Temperature</b>	River (mi)	92
	Lakes (acres)	0
	Estuary (sq. mi.)	-

**TABLE 3.2-4-3 WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES  
IN ROANOKE BASIN**

<i>Source of Impairment</i>	<i>Type</i>	<i>Impaired (Rounded to Nearest Whole Number)</i>
<b>Clean Sediments</b>	River (mi)	25
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Crop Production</b>	River (mi)	7
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Discharge from Storm Sewer (MS4)</b>	River (mi)	81
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Dam or Impoundment</b>	River (mi)	19
	Lakes (acres)	1,381
	Estuary (sq. mi.)	-
<b>Drought Related Impacts</b>	River (mi)	2
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Erosion from Derelict Land</b>	River (mi)	7
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Industrial Point Source</b>	River (mi)	12
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Industrial Stormwater Discharge</b>	River (mi)	12
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Landfills</b>	River (mi)	2
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Livestock Grazing</b>	River (mi)	770
	Lakes (acres)	880
	Estuary (sq. mi.)	-
<b>Loss of Riparian Habitat</b>	River (mi)	82
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Managed Pasture Grazing</b>	River (mi)	7
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Municipal Urbanized High Density Area</b>	River (mi)	280
	Lakes (acres)	350
	Estuary (sq. mi.)	-
<b>Municipal Point Source Discharges</b>	River (mi)	36
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Natural Conditions – Water Quality Use Attainability</b>	River (mi)	51
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Non-Point Source</b>	River (mi)	16
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>On Site Treatment Systems</b>	River (mi)	527
	Lakes (acres)	880
	Estuary (sq. mi.)	-

<i>Source of Impairment</i>	<i>Type</i>	<b>Impaired (Rounded to Nearest Whole Number)</b>
<b>Package Plant or Other Permitted Small Flow Discharges</b>	River (mi)	3
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Post Development Erosion/Sedimentation</b>	River (mi)	12
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Residential Districts</b>	River (mi)	58
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Sanitary Sewer Overflows</b>	River (mi)	81
	Lakes (acres)	350
	Estuary (sq. mi.)	-
<b>Sediment Resuspension (clean)</b>	River (mi)	103
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Sediment Resuspension (contaminated)</b>	River (mi)	10
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Silviculture</b>	River (mi)	14
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Source Unknown</b>	River (mi)	920
	Lakes (acres)	60,586
	Estuary (sq. mi.)	-
<b>Streambank Modification or Destabilization</b>	River (mi)	48
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Unspecified Domestic Waste</b>	River (mi)	762
	Lakes (acres)	1,230
	Estuary (sq. mi.)	-
<b>Urban Stormwater</b>	River (mi)	15
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Urban Runoff/Sewer Systems</b>	River (mi)	8
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Waste from Pets</b>	River (mi)	253
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Wet Weather Discharges (Nonpoint Sources)</b>	River (mi)	262
	Lakes (acres)	350
	Estuary (sq. mi.)	-
<b>Wet Weather Discharges (Point Sources/Stormwater)</b>	River (mi)	24
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Wildlife other than Waterfowl</b>	River (mi)	834
	Lakes (acres)	1,230
	Estuary (sq. mi.)	-

### **Chowan River-Dismal Swamp Basin**

The Chowan River and Dismal Swamp Basin is located in the southeastern portion of Virginia and covers 4,061 square miles or approximately 10 percent of the Commonwealth's total area.

The Basin extends eastward from Charlotte County to the Chesapeake Bay. The Chowan River-Dismal Swamp Basin in Virginia is defined by both hydrologic and political boundaries - the James River Basin to the north, the Small Coastal River Basins to the east, the Roanoke River Basin to the west and the Virginia/North Carolina State line to the south border the basin. The basin is approximately 145 miles in length and varies from 10 to 50 miles in width. The Chowan River-Dismal Swamp Basin flows through the Piedmont and Coastal Plain Physiological Provinces. The Chowan portion flows 130 miles from east to west, crossing both the Piedmont and Coastal Plain, while the Dismal Swamp lies entirely within the Coastal Plain. The Piedmont portion is characterized by rolling hills, steeper slopes and somewhat more pronounced stream valleys. The Coastal Plain, in contrast, is nearly flat with a descending series of terraces.

The Chowan River-Dismal Swamp Basin is mostly rural with approximately 64 percent of its land covered by forest. Cropland and pasture make up another 28 percent, while only about 6 percent is classified as urban.

The 2006 population for the Chowan River-Dismal Swamp Basin was approximately 397,003. All or portions of the following 13 counties and five cities lie within the basin: counties – Brunswick, Charlotte, Dinwiddie, Greensville, Isle of Wight, Lunenburg, Mecklenburg, Nottoway, Prince Edward, Prince George, Southampton, Surry, and Sussex; Cities – Chesapeake, Emporia, Franklin, Petersburg, Suffolk, and Virginia Beach.

Major tributaries of the Chowan River are the Meherrin, the Nottoway and the Blackwater. The Nottoway and the Blackwater join at the Virginia/North Carolina state line to form the Chowan River. The Dismal Swamp portion is mostly flat with many swamp and marshland areas.

The Chowan River-Dismal Swamp Basin is divided into five USGS hydrologic units as follows: HUC 03010204 – Nottoway; HUC 03010202 – Blackwater; HUC 03010203 – Chowan; HUC 03010204 – Meherrin; and HUC 03010205 – Albemarle Sound. The five hydrologic units are further divided into 44 waterbodies or watersheds.

Basin assessment information is presented in Tables 3.2-5-1, 3.2-5-2, 3.2-5-3.

TABLE 3.2-5-1

## CHOWAN-DISMAL SWAMP BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

**Basin Size: All Sizes Rounded to Nearest Whole Number**

Rivers - 5,865 miles

Lakes - 4,676 acres

Estuaries - 39 sq. miles

Designated Use	Water Body Type	Fully Supporting	Total Impaired	Naturally Impaired	Insufficient Information	Not Assessed	Total Assessed
Aquatic Life	River (mi)	726	970	667	145	4,024	1,696
	Lakes (acres)	251	4,162	0	0	263	4,413
	Estuary (sq. mi.)	18	21	0	0	0	39
Fish Consumption	River (mi)	249	880	0	20	4,716	1,128
	Lakes (acres)	380	3,242	0	0	1,054	3,622
	Estuary (sq. mi.)	0	0	0	0	39	0
Public Water Supply	River (mi)	22	0	0	0	232	22
	Lakes (acres)	913	0	0	0	120	913
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Recreation	River (mi)	489	692	0	73	4,611	1,181
	Lakes (acres)	4,143	0	0	51	482	4,143
	Estuary (sq. mi.)	37	0	0	2	0	37
Shellfishing	River (mi)	NA	NA	NA	NA	NA	NA
	Lakes (acres)	NA	NA	NA	NA	NA	NA
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Wildlife	River (mi)	1,323	20	0	74	4,447	1,343
	Lakes (acres)	4,413	0	0	0	263	4,413
	Estuary (sq. mi.)	0	0	0	0	39	0

**TABLE 3.2-5-2 WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE CATEGORIES IN CHOWAN-DISMAL SWAMP BASIN**

<i>Pollutant</i>	<i>Type</i>	<b>Impaired (Rounded to Nearest Whole Number)</b>
<b>General Standards (Benthics)</b>	River (mi)	92
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Ammonia</b>	River (mi)	1
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Chloride</b>	River (mi)	33
	Lakes (acres)	0
	Estuary (sq. mi.)	18
<b>Dissolved Oxygen</b>	River (mi)	887
	Lakes (acres)	4,024
	Estuary (sq. mi.)	0
<b>Escherichia coli Pathogen Indicators</b>	River (mi)	555
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Fecal Coliform Pathogen Indicators</b>	River (mi)	137
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Mercury in Fish Tissue</b>	River (mi)	853
	Lakes (acres)	3,242
	Estuary (sq. mi.)	0
<b>PCB in Fish Tissue</b>	River (mi)	26
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>pH</b>	River (mi)	317
	Lakes (acres)	3,500
	Estuary (sq. mi.)	3



**TABLE 3.2-5-3 WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES  
IN CHOWAN-DISMAL SWAMP BASIN**

<i>Source of Impairment</i>	<i>Type</i>	<i>Impaired (Rounded to Nearest Whole Number)</i>
<b>Agriculture</b>	River (mi)	83
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Animal Feeding Operations</b>	River (mi)	20
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Atmospheric Deposition (Toxic)</b>	River (mi)	460
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Changes in Ordinary Stratification and Bottom Water Hypoxia/Anoxia</b>	River (mi)	0
	Lakes (acres)	260
	Estuary (sq. mi.)	0
<b>Dam or Impoundment</b>	River (mi)	33
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Industrial Point Source Discharge</b>	River (mi)	4
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Livestock Grazing</b>	River (mi)	44
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Municipal Point Source Discharges</b>	River (mi)	15
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Natural Conditions – Water Quality Use Attainability</b>	River (mi)	874
	Lakes (acres)	0
	Estuary (sq. mi.)	18
<b>Non Point Source</b>	River (mi)	116
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>On-site Septic System</b>	River (mi)	83
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Source Unknown</b>	River (mi)	1,358
	Lakes (acres)	3,902
	Estuary (sq. mi.)	3
<b>Unspecified Urban Stormwater</b>	River (mi)	1
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Unspecified Domestic Waste</b>	River (mi)	27
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Wastes from Pets</b>	River (mi)	44
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Wildlife other than Waterfowl</b>	River (mi)	127
	Lakes (acres)	0
	Estuary (sq. mi.)	0

## **Tennessee-Big Sandy River Basin**

The segment of the Tennessee and Big Sandy River Basin which lies in Virginia is made up of the Holston, Clinch-Powell, and Big Sandy River Subbasins. These subbasins are located in the extreme southwest portion of Virginia and cover 4,140 square miles or approximately 10.5 percent of the Commonwealth's total land area.

The Virginia portion of the Tennessee-Big Sandy River Basin is defined by both hydrologic and political boundaries. The West Virginia State line lies to the northeast, Kentucky to the west, and Tennessee to the south. The New River Basin makes up the eastern boundary.

While numerous southwestern Virginia streams feed the Tennessee and Big Sandy Rivers, neither river forms within the Commonwealth itself. The Big Sandy Subbasin contains the Levisa and Tug Forks that flows northward into Kentucky forming the Big Sandy River. The southwestward flowing Holston, Clinch, and Powell tributaries form the Tennessee River in Tennessee. Both of the major river subbasins eventually empty into the Gulf of Mexico via the Ohio and Mississippi Rivers.

The Tennessee-Big Sandy River Basin spans three physiographic provinces: Cumberland Plateau, Valley and Ridge, and the Blue Ridge. The Big Sandy portion of the basin lies within the Cumberland Plateau. This province is characterized as rugged, with mountainous terrain and steep valleys. Parallel valleys and ridges running in a northeast to southwest direction characterize the Tennessee portion, lying in the Valley and Ridge Province. A small portion, located in the Blue Ridge Province, is more like a plateau with no single, prominent ridge that characterizes the Ridge and Valley province to the north.

Within Virginia, approximately 48 percent of the Tennessee River Basin is forested, while cropland and pasture make up another 39.7 percent. The Big Sandy portion of the basin is approximately 86 percent forest, with only about 5 percent in cropland and pasture. Urban areas make up only a small percentage of the total land area.

The 2006 population for the Tennessee-Big Sandy River Basin was approximately 297,451. All or parts of the following jurisdictions lie within the basin: counties – Buchanan, Dickinson, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wise, and Wythe; Cities – Bristol and Norton.

The Tennessee-Big Sandy River Basin is divided into six USGS hydrologic units as follows: HUC 05070201 – Tug Fork; HUC 05070202 – Upper Levisa; HUC 06010101 – North Fork Holston; HUC 06010102 – South and Middle Fork Holston; HUC 06010205 – Upper Clinch; and HUC 01010206 – Powell River. The six hydrologic units are further divided into 48 waterbodies or watersheds.

Basin assessment information is presented in Tables 3.2-6-2, 3.2-6-2, 3.2-6-3.

TABLE 3.2-6-1

## TENNESSEE – BIG SANDY RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY

**Basin Size: All Sizes Rounded to Nearest Whole Number**

Rivers - 5,878 miles

Lakes - 3,737 acres

Estuaries - 0 sq. miles

Designated Use	Water Body Type	Fully Supporting	Total Impaired	Naturally Impaired	Insufficient Information	Not Assessed	Total Assessed
Aquatic Life	River (mi)	886	400	3	360	4,233	1,285
	Lakes (acres)	3,225	513	513	0	0	3,737
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Fish Consumption	River (mi)	121	272	0	0	5,485	393
	Lakes (acres)	1,490	0	0	0	2,247	1,490
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Public Water Supply	River (mi)	0	0	0	0	264	0
	Lakes (acres)	0	0	0	0	3,239	0
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Recreation	River (mi)	148	880	0	236	4,615	1,028
	Lakes (acres)	3,594	0	0	0	144	3,594
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Shellfishing	River (mi)	NA	NA	NA	NA	NA	NA
	Lakes (acres)	NA	NA	NA	NA	NA	NA
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Wildlife	River (mi)	1,164	6	0	3	4,705	1,170
	Lakes (acres)	3,565	0	0	0	172	3,565
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA

**TABLE 3.2-6-2 WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE CATEGORIES IN TENNESSEE-BIG SANDY BASIN**

<i><b>Pollutant</b></i>	<i><b>Type</b></i>	<i><b>Impaired (Rounded to Nearest Whole Number)</b></i>
<b>General Standards (Benthics)</b>	River (mi)	404
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Chloride</b>	River (mi)	6
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Dissolved Oxygen</b>	River (mi)	0
	Lakes (acres)	200
	Estuary (sq. mi.)	-
<b>Escherichia coli Pathogen Indicators</b>	River (mi)	638
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Fecal Coliform Pathogen Indicators</b>	River (mi)	290
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Lead</b>	River (mi)	7
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Mercury in Fish Tissue</b>	River (mi)	82
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>PCB in Fish Tissue</b>	River (mi)	264
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>pH</b>	River (mi)	0
	Lakes (acres)	513
	Estuary (sq. mi.)	-
<b>Temperature</b>	River (mi)	5
	Lakes (acres)	0
	Estuary (sq. mi.)	-

**TABLE 3.2-6-3 WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES  
IN TENNESSEE-BIG SANDY BASIN**

<i>Source of Impairment</i>	<i>Type</i>	<i>Impaired (Rounded to Nearest Whole Number)</i>
<b>Acid Mine Drainage</b>	River (mi)	27
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Animal Feeding Operations</b>	River (mi)	176
	Lakes (acres)	103
	Estuary (sq. mi.)	-
<b>Agriculture</b>	River (mi)	54
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Atmospheric Deposition – Acidity</b>	River (mi)	11
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Coal Mining</b>	River (mi)	33
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Coal Mining (Subsurface)</b>	River (mi)	23
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Grazing in Riparian or Shoreline Zones</b>	River (mi)	116
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Industrial Point Source Discharge</b>	River (mi)	71
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Livestock Grazing or Feeding Operations</b>	River (mi)	117
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Loss of Riparian Habitat</b>	River (mi)	79
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Rural (Residential Areas)</b>	River (mi)	408
	Lakes (acres)	103
	Estuary (sq. mi.)	-
<b>Septage Disposal</b>	River (mi)	56
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Source Unknown</b>	River (mi)	531
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Natural Conditions – Water Quality Use Attainability</b>	River (mi)	11
	Lakes (acres)	200
	Estuary (sq. mi.)	-
<b>Streambank Modification</b>	River (mi)	82
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Surface Mining</b>	River (mi)	67
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Un-permitted Discharge</b>	River (mi)	6
	Lakes (acres)	0
	Estuary (sq. mi.)	-

<b><i>Source of Impairment</i></b>	<b><i>Type</i></b>	<b><i>Impaired (Rounded to Nearest Whole Number)</i></b>
<b>Wastes from Pets</b>	River (mi)	2
	Lakes (acres)	0
	Estuary (sq. mi.)	-

## **Chesapeake Bay and Small Coastal Basins**

The Chesapeake Bay/Small Coastal Basin is located in the eastern part of Virginia and covers 1,588 square miles or approximately 4 percent of the Commonwealth's total land area. The basin encompasses the small bays, river inlets, islands and shoreline immediately surrounding the Chesapeake Bay and the southern tip of the Delmarva Peninsula. This basin also includes the Chesapeake Bay itself.

The Chesapeake Bay/Coastal Basin is defined by both hydrologic and political boundaries. The Potomac River Basin, the Rappahannock River Basin, the York River Basin, the James River Basin and the Chowan River-Dismal Swamp Basin border the basin to its west. The Eastern Shore portion is bordered on the west by the Chesapeake Bay, on the north by Maryland, and on the east by the Atlantic Ocean.

The topography of the Chesapeake Bay/Coastal Basin varies little. The entire basin lies within the Coastal Plain Physiographic Province where elevations average no more than a few feet above sea level. More significant elevation occurs along the central spine of the Eastern Shore portion, which forms a plateau about 45 feet above sea level. Much of the Chesapeake Bay/Coastal Basin is marshland. About 30 percent of the Chesapeake Bay/Coastal Basin is forested, while nearly 21.6 percent is in cropland and pasture. Approximately 24 percent is considered urban.

The 2006 population for the Chesapeake Bay/Coastal Basin was approximately 753,634. All or portions of the following jurisdictions lie within the basin: Counties – Accomack, Gloucester, King and Queen, Lancaster, Matthews, Middlesex, Northampton, Northumberland, and York; Cities – Chesapeake, Hampton, Newport News, Norfolk, Poquoson, and Virginia Beach.

Tributaries in the Chesapeake Bay/Coastal Basin drain into the Chesapeake Bay or the Atlantic Ocean. Major tributaries flowing into the Chesapeake Bay from the western shore are the Great Wicomico River, Piankatank River, Fleets Bay, Mobjack Bay including the East, North, Ware, and Severn Rivers, Poquoson River, Back River and Lynnhaven River. Tributaries in the Eastern Shore portion that drain into the Bay are Pocomoke, Onancock, Pungoteague, Occohannock, and Nassawadox Creeks. Machipongo River, Assawoman Creek, Parker Creek, Folly Creek, and Finney Creek drain east directly into the Atlantic Ocean.

The Chesapeake Bay/Coastal Basin is divided into seven USGS hydrologic units as follows: HUC 02060009 – Pocomoke River; HUC 02060010 – Chincoteague Bay; HUC 02080101 – Mainstem open bay; HUC 02080102 – Upper Western Shore Tributaries; HUC 02080108 – Lower Western Shore Tributaries; HUC 02080109 – Tributaries on the Eastern Shore which drain to the Chesapeake Bay; and HUC 02080110 – Tributaries on the Eastern Shore which drain to the Atlantic Ocean. The seven hydrologic units are further divided into 31 waterbodies or watersheds.

Basin assessment information is presented in Table 3.2-7-1, 3.2-7-2, 3.2-7-3.

TABLE 3.2-7-1

## CHESAPEAKE BAY-SMALL COASTAL BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

**Basin Size: All Sizes Rounded to Nearest Whole Number**

Rivers - 894 miles

Lakes - 1,954 acres

Estuaries - 1,704 sq. miles

Designated Use	Water Body Type	Fully Supporting	Total Impaired	Naturally Impaired	Insufficient Information	Not Assessed	Total Assessed
Aquatic Life	River (mi)	41	96	0	0	756	138
	Lakes (acres)	660	1,137	0	54	103	1,797
	Estuary (sq. mi.)	51	1,600	0	4	48	1,651
Fish Consumption	River (mi)	8	31	0	0	855	40
	Lakes (acres)	906	749	0	28	272	1,655
	Estuary (sq. mi.)	1	1,599	0	0	103	1,600
Public Water Supply	River (mi)	0	0	0	0	14	0
	Lakes (acres)	0	0	0	0	1,954	0
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Recreation	River (mi)	39	44	0	2	809	83
	Lakes (acres)	457	0	0	0	1,497	457
	Estuary (sq. mi.)	65	14	0	44	1,581	79
Shellfishing	River (mi)	NA	NA	NA	NA	NA	NA
	Lakes (acres)	NA	NA	NA	NA	NA	NA
	Estuary (sq. mi.)	1,627	41	0	0	0	1,667
Wildlife	River (mi)	98	4	0	0	793	102
	Lakes (acres)	385	258	0	0	1,312	642
	Estuary (sq. mi.)	99	0	0	0	1,605	99

## Chesapeake Bay Designated Uses

Open-Water Aquatic Life	Estuary (sq. mi.)	39	1,171	0	389	0	1,210
Deep-Water Aquatic Life	Estuary (sq. mi.)	0	331	0	170	0	331
Deep-Channel Seasonal Refuge	Estuary (sq. mi.)	0	188	0	0	0	188
Shallow-Water Submerged Aquatic Vegetation	Estuary (sq. mi.)	0	1,596	0	0	0	1,596
Migratory Fish Spawning and Nursery	Estuary (sq. mi.)	0	0	0	3	7	0



**TABLE 3.2-7-2 WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE CATEGORIES IN CHESAPEAKE BAY – SMALL COASTAL BASIN**

<i><b>Pollutant</b></i>	<i><b>Type</b></i>	<i><b>Impaired (Rounded to Nearest Whole Number)</b></i>
<b>Aquatic Plants (Macrophytes)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1,596
<b>General Standards (Benthics)</b>	River (mi)	20
	Lakes (acres)	0
	Estuary (sq. mi.)	203
<b>Chloride</b>	River (mi)	3
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Copper</b>	River (mi)	1
	Lakes (acres)	258
	Estuary (sq. mi.)	0
<b>Dissolved Oxygen</b>	River (mi)	66
	Lakes (acres)	1,137
	Estuary (sq. mi.)	1,378
<b>Enterococcus Pathogen Indicators</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	12
<b>Escherichia coli Pathogen Indicators</b>	River (mi)	27
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Fecal Coliform Pathogen Indicators</b>	River (mi)	18
	Lakes (acres)	0
	Estuary (sq. mi.)	41
<b>Mercury in Fish Tissue</b>	River (mi)	31
	Lakes (acres)	549
	Estuary (sq. mi.)	3
<b>PCB in Fish Tissue</b>	River (mi)	0
	Lakes (acres)	749
	Estuary (sq. mi.)	1,599
<b>pH</b>	River (mi)	52
	Lakes (acres)	0
	Estuary (sq. mi.)	0

**TABLE 3.2-7-3 WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES  
IN CHESAPEAKE BAY – SMALL COASTAL BASIN**

<i>Source of Impairment</i>	<i>Type</i>	<i>Impaired (Rounded to Nearest Whole Number)</i>
<b>Agriculture</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1,599
<b>Atmospheric Deposition – Nitrogen</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1,599
<b>Atmospheric Deposition – Toxics</b>	River (mi)	31
	Lakes (acres)	0
	Estuary (sq. mi.)	3
<b>Changes in Ordinary Stratification and Bottom Water Hypoxia/Anoxia</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	4
<b>Clean Sediments</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1,596
<b>Contaminated Sediments</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	8
<b>Discharge from Municipal Separate Storm Sewer Systems</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	7
<b>Industrial Point Sources</b>	River (mi)	1
	Lakes (acres)	0
	Estuary (sq. mi.)	1,599
<b>Internal Nutrient Cycling</b>	River (mi)	1
	Lakes (acres)	0
	Estuary (sq. mi.)	1,599
<b>Leaking Underground Storage Tanks</b>	River (mi)	1
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Loss of Riparian Habitat</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1,599
<b>Urbanized High Density Area</b>	River (mi)	2
	Lakes (acres)	258
	Estuary (sq. mi.)	7
<b>Municipal Point Source Discharges</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1,599
<b>Natural Conditions – Water Quality Use Attainability</b>	River (mi)	47
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Natural Sources</b>	River (mi)	7
	Lakes (acres)	0
	Estuary (sq. mi.)	7
<b>Non-Point Sources</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	17
<b>On-site Treatment Systems</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	7

<b>Source of Impairment</b>	<b>Type</b>	<b>Impaired (Rounded to Nearest Whole Number)</b>
<b>Residential Districts</b>	River (mi)	0
	Lakes (acres)	952
	Estuary (sq. mi.)	0
<b>Sediment Resuspension (Clean)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1,596
<b>Source Unknown</b>	River (mi)	84
	Lakes (acres)	1,192
	Estuary (sq. mi.)	1,602
<b>Sources Outside State Jurisdiction or Borders</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1,599
<b>Wet Weather Discharge (Non Point Source)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	70
<b>Wet Weather Discharge (Point Source)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1,599

## **York River Basin**

The York River Basin lies in the central and eastern section of Virginia and covers 2,662 square miles or 7 percent of the Commonwealth's total area. It is defined by hydrologic boundaries. The basin is bound by the Rappahannock River Basin to the north and east and the James River Basin to the south and west.

The headwaters of the York River begin in Orange County and flow in a southeasterly direction for approximately 220 miles to its mouth at the Chesapeake Bay. The basin's width varies from five miles at the mouth to 40 miles at its headwaters.

The basin is comprised of the York River and its two major tributaries, the Pamunkey and the Mattaponi Rivers. The York River itself is only about 30 miles in length. The Pamunkey River's major tributaries are the North and South Anna Rivers and the Little River, while the major Mattaponi tributaries are the Matta, Po and Ni Rivers.

Lying in the Piedmont and Coastal Plain physiographic provinces, the basin's topography is characterized by slightly rolling hills at the headwaters or extreme western portion, to gently sloping hills and flat farmland near its mouth. Tributaries in the central Piedmont exhibit moderate and near constant profiles. Their flat slope largely characterizes streams in the Coastal Plain. Approximately 65 percent of the land area is forest. Farmland and pasture account for approximately 20 percent of the land area. Approximately 10 percent of the river basin land area is urban.

The 2006 population for the York River Basin was approximately 309,067. The majority of the population is rural and is evenly distributed throughout the basin. The only major city that falls within this basin is a portion of Williamsburg. All or portions of the following twelve counties lie within the basin: Albemarle, Caroline, Gloucester, Goochland, Hanover, James City, King and Queen, King William, Louisa, New Kent, Orange, Spotsylvania, and York.

The York River Basin is divided into four USGS hydrologic units as follows: HUC 02080102 – Great Wicomico-Piankatank Subbasin, HUC 02080105 – Mattaponi River Subbasin; HUC 02080106 - Pamunkey River Subbasin; and HUC 02080107 - York River Subbasin. The four hydrologic units are further divided into 23 waterbodies or watersheds.

Basin assessment information is presented in Tables 3.2-8-1, 3.2-8-2, 3.2-8-3.

TABLE 3.2-8-1

## YORK RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

**Basin Size: All Sizes Rounded to Nearest Whole Number**

Rivers - 3,343 miles

Lakes - 11,217 acres

Estuaries - 84 sq. miles

Designated Use	Water Body Type	Fully Supporting	Total Impaired	Naturally Impaired	Insufficient Information	Not Assessed	Total Assessed
Aquatic Life	River (mi)	417	268	74	12	2,646	685
	Lakes (acres)	10,730	314	2	0	173	11,044
	Estuary (sq. mi.)	1	82	0	0	0	84
Fish Consumption	River (mi)	78	57	0	19	3,189	135
	Lakes (acres)	1,170	9,698	0	0	350	10,868
	Estuary (sq. mi.)	13	63	0	0	8	75
Public Water Supply	River (mi)	7	0	0	0	236	7
	Lakes (acres)	0	0	0	0	1,150	0
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Recreation	River (mi)	169	286	0	85	2,802	456
	Lakes (acres)	9,809	74	0	0	1,334	9,883
	Estuary (sq. mi.)	59	16	0	0	8	75
Shellfishing	River (mi)	NA	NA	NA	NA	NA	NA
	Lakes (acres)	NA	NA	NA	NA	NA	NA
	Estuary (sq. mi.)	47	13	0	0	0	60
Wildlife	River (mi)	534	5	0	8	2,795	540
	Lakes (acres)	9,806	26	0	0	1,385	9,832
	Estuary (sq. mi.)	38	8	0	0	37	46

## Chesapeake Bay Designated Uses

Open-Water Aquatic Life	Estuary (sq. mi.)	1	74	0	8	0	75
Deep-Water Aquatic Life	Estuary (sq. mi.)	0	24	0	0	0	24
Deep-Channel Seasonal Refuge	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Shallow-Water Submerged Aquatic Vegetation	Estuary (sq. mi.)	9	64	0	0	0	73
Migratory Fish Spawning and Nursery	Estuary (sq. mi.)	0	0	0	0	34	0

**TABLE 3.2-8-2 WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE CATEGORIES IN YORK BASIN**

<i>Pollutant</i>	<i>Type</i>	<b>Impaired (Rounded to Nearest Whole Number)</b>
<b>Aquatic Plants (Macrophytes)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	64
<b>General Standards (Benthics)</b>	River (mi)	10
	Lakes (acres)	0
	Estuary (sq. mi.)	3
<b>Benzo(k)fluoranthene</b>	River (mi)	5
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Cadmium</b>	River (mi)	5
	Lakes (acres)	26
	Estuary (sq. mi.)	0
<b>Chloride</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	15
<b>Dissolved Oxygen</b>	River (mi)	88
	Lakes (acres)	288
	Estuary (sq. mi.)	74
<b>E. coli Pathogen Indicators</b>	River (mi)	251
	Lakes (acres)	74
	Estuary (sq. mi.)	0
<b>Enterococcus Pathogen Indicators</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	15
<b>Fecal Coliform Pathogen Indicators</b>	River (mi)	35
	Lakes (acres)	0
	Estuary (sq. mi.)	13
<b>Lead</b>	River (mi)	5
	Lakes (acres)	26
	Estuary (sq. mi.)	0
<b>Mercury in Fish Tissue</b>	River (mi)	35
	Lakes (acres)	102
	Estuary (sq. mi.)	5
<b>Nutrient/Eutrophication Biological Indicators</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	8
<b>PCB in Fish Tissue</b>	River (mi)	27
	Lakes (acres)	9,595
	Estuary (sq. mi.)	58
<b>pH</b>	River (mi)	187
	Lakes (acres)	26
	Estuary (sq. mi.)	2
<b>Zinc</b>	River (mi)	5
	Lakes (acres)	26
	Estuary (sq. mi.)	0

**TABLE 3.2-8-3 WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES  
IN YORK BASIN**

<i>Source of Impairment</i>	<i>Type</i>	<i>Impaired (Rounded to Nearest Whole Number)</i>
<b>Agriculture</b>	River (mi)	6
	Lakes (acres)	0
	Estuary (sq. mi.)	74
<b>Atmospheric Deposition (Nitrogen)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	74
<b>Atmospheric Deposition (Toxics)</b>	River (mi)	17
	Lakes (acres)	0
	Estuary (sq. mi.)	5
<b>Changes in Stratification and Bottom Water Hypoxia</b>	River (mi)	0
	Lakes (acres)	288
	Estuary (sq. mi.)	0
<b>Clean Sediments</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	64
<b>Grazing in Shoreline/Riparian Zones</b>	River (mi)	64
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Impacts from Abandoned Mine Lands</b>	River (mi)	5
	Lakes (acres)	26
	Estuary (sq. mi.)	0
<b>Impacts from Land Application of Wastes</b>	River (mi)	64
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Livestock Grazing</b>	River (mi)	64
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Industrial Point Source Discharge</b>	River (mi)	6
	Lakes (acres)	0
	Estuary (sq. mi.)	75
<b>Internal Nutrient Recycling</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	74
<b>Loss of Riparian Habitat</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	74
<b>Municipal Point Source Discharges</b>	River (mi)	31
	Lakes (acres)	0
	Estuary (sq. mi.)	75
<b>Natural Conditions – Water Quality Use Attainability</b>	River (mi)	231
	Lakes (acres)	0
	Estuary (sq. mi.)	17
<b>On-site Treatment Systems</b>	River (mi)	10
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Runoff from Grassland/Forests</b>	River (mi)	64
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Sediment Resuspension (Clean)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	64

<b>Source of Impairment</b>	<b>Type</b>	<b>Impaired (Rounded to Nearest Whole Number)</b>
<b>Non Point Sources</b>	River (mi)	51
	Lakes (acres)	0
	Estuary (sq. mi.)	25
<b>Sewage Discharge in Unsewered Areas</b>	River (mi)	64
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Source Unknown</b>	River (mi)	240
	Lakes (acres)	9,986
	Estuary (sq. mi.)	78
<b>Sources Outside of State Jurisdiction</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	74
<b>Wastes from Pets</b>	River (mi)	64
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Waterfowl</b>	River (mi)	64
	Lakes (acres)	0
	Estuary (sq. mi.)	0
<b>Wet Weather Discharges (Non Point Sources)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	34
<b>Wet Weather Discharges (Point Sources)</b>	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	74
<b>Wildlife Other Than Waterfowl</b>	River (mi)	64
	Lakes (acres)	0
	Estuary (sq. mi.)	0



## **New River Basin**

The New River Basin is located in southwest Virginia and covers 3,070 square miles or approximately 8 percent of the Commonwealth's total land area. The New River flows from its headwaters in Watauga County, North Carolina in a northeasterly direction to Radford, Virginia, and then in a northwesterly direction to Glen Lyn, where it exits into West Virginia. There it flows to the confluence of the Gauley River forming the Kanawha River, a tributary to the Ohio River.

The New River Basin in Virginia is defined by both hydrologic and political boundaries. It is bordered by the James River Basin and Roanoke River Basin to the east, and the Big Sandy River Basin and Tennessee River Basin to the west. The southern boundary of the Virginia portion is the North Carolina State line and its northwest boundary is the West Virginia State line.

The New River Basin runs 115 miles in length from Blowing Rock, North Carolina to Bluestone Dam near Hinton, West Virginia with a maximum basin width of 70 miles near Rural Retreat, Virginia. The Virginia portion of the New River Basin is 87 miles in length.

The topography of the New River Basin is generally rugged; the upper reaches of its tributaries are extremely steep. High mountains, narrow valleys and steep ravines characterize the basin. There are ten tributaries in the Upper New River Basin each having more than 100 square miles in drainage area and many others with forty or more square miles.

The New River Basin is the least densely populated of the Commonwealth's major river basins. The higher elevations of the basin have steep slopes and are thickly forested, while the mount bases are mostly used for agriculture. Approximately 59 percent of its land is forested. Cropland and pasture make up another 35 percent, with approximately 3 percent considered urban.

The 2006 population for the New River Basin was approximately 208,395. All or portions of the following 11 counties lie within the basin: Bland, Carroll, Craig, Floyd, Giles, Grayson, Montgomery, Pulaski, Smyth, Tazewell, Wythe, and the cities of Galax and Radford.

The New River Basin is divided into two USGS hydrologic units as follows: HUC 05050001 – Upper New; and HUC 05050002 – Middle New. The two hydrologic units are further divided into 35 waterbodies or watersheds.

Basin assessment information is presented in Tables 3.2-9-1, 3.2-9-2, 3.2-9-3.

TABLE 3.2-9-1

## NEW RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

**Basin Size: All Sizes Rounded to Nearest Whole Number**

Rivers - 4,113 miles

Lakes - 4,644 acres

Estuaries - 0 sq. miles

Designated Use	Water Body Type	Fully Supporting	Total Impaired	Naturally Impaired	Insufficient Information	Not Assessed	Total Assessed
Aquatic Life	River (mi)	790	215	0	75	3,033	1,005
	Lakes (acres)	2,261	2,348	2,348	0	36	4,609
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Fish Consumption	River (mi)	140	135	0	38	3,799	275
	Lakes (acres)	0	4,287	0	0	358	4,287
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Public Water Supply	River (mi)	27	0	0	0	315	27
	Lakes (acres)	1,999	0	0	0	36	1,999
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Recreation	River (mi)	202	644	0	47	3,221	846
	Lakes (acres)	4,548	60	0	0	36	4,609
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Shellfishing	River (mi)	NA	NA	NA	NA	NA	NA
	Lakes (acres)	NA	NA	NA	NA	NA	NA
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA
Wildlife	River (mi)	896	0	0	21	3,196	896
	Lakes (acres)	4,548	0	0	0	96	4,548
	Estuary (sq. mi.)	NA	NA	NA	NA	NA	NA

**TABLE 3.2-9-2 WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE CATEGORIES IN NEW BASIN**

<i>Pollutant</i>	<i>Type</i>	<b>Impaired (Rounded to Nearest Whole Number)</b>
<b>General Standards (Benthics)</b>	River (mi)	128
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Chlordane</b>	River (mi)	1
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Copper</b>	River (mi)	4
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>DDE/DDT</b>	River (mi)	10
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Dissolved Oxygen</b>	River (mi)	5
	Lakes (acres)	2,348
	Estuary (sq. mi.)	-
<b>Escherichia coli Pathogen indicators</b>	River (mi)	454
	Lakes (acres)	60
	Estuary (sq. mi.)	-
<b>Fecal Coliform Pathogen Indicators</b>	River (mi)	262
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Heptachlor Epoxide</b>	River (mi)	10
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Mercury in Fish Tissue</b>	River (mi)	29
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>pH</b>	River (mi)	0
	Lakes (acres)	85
	Estuary (sq. mi.)	-
<b>PCB in Fish Tissue</b>	River (mi)	103
	Lakes (acres)	4,287
	Estuary (sq. mi.)	-
<b>PCB's</b>	River (mi)	3
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Temperature</b>	River (mi)	95
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Zinc</b>	River (mi)	4
	Lakes (acres)	0
	Estuary (sq. mi.)	-

**TABLE 3.2-9-3 WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES  
IN NEW BASIN**

<i>Source of Impairment</i>	<i>Type</i>	<i>Impaired (Rounded to Nearest Whole Number)</i>
<b>Channelization</b>	River (mi)	16
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Animal Feeding Operations</b>	River (mi)	53
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Discharge from Municipal Separate Storm Sewer Systems</b>	River (mi)	17
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Contaminated Sediments</b>	River (mi)	4
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Grazing in Riparian Zone</b>	River (mi)	74
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Impacts from Abandoned Mine lands</b>	River (mi)	9
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Industrial Point Source Stormwater Discharges</b>	River (mi)	10
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Livestock Grazing or Feeding Operations</b>	River (mi)	422
	Lakes (acres)	60
	Estuary (sq. mi.)	-
<b>Loss of Riparian Habitat</b>	River (mi)	67
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Natural Conditions – Water Quality Use Attainability</b>	River (mi)	0
	Lakes (acres)	2,348
	Estuary (sq. mi.)	-
<b>Erosion and Sedimentation</b>	River (mi)	12
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>On-site Treatment Systems</b>	River (mi)	256
	Lakes (acres)	60
	Estuary (sq. mi.)	-
<b>Residential Districts</b>	River (mi)	7
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Rural (Residential Areas)</b>	River (mi)	16
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Sanitary Sewer Overflows</b>	River (mi)	6
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Septage Disposal</b>	River (mi)	5
	Lakes (acres)	0
	Estuary (sq. mi.)	-

<b>Source of Impairment</b>	<b>Type</b>	<b>Impaired (Rounded to Nearest Whole Number)</b>
<b>Source Unknown</b>	River (mi)	337
	Lakes (acres)	4,287
	Estuary (sq. mi.)	-
<b>Sediment Resuspension (Clean)</b>	River (mi)	56
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Sediment Resuspension (Contaminated)</b>	River (mi)	5
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Streambank Modification and Destabilization</b>	River (mi)	18
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Unspecified Domestic Waste</b>	River (mi)	282
	Lakes (acres)	60
	Estuary (sq. mi.)	-
<b>Urbanized High Density Area</b>	River (mi)	56
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Waste from Pets</b>	River (mi)	52
	Lakes (acres)	0
	Estuary (sq. mi.)	-
<b>Wet Weather Discharges (Non-point Sources)</b>	River (mi)	205
	Lakes (acres)	60
	Estuary (sq. mi.)	-
<b>Wildlife other than Waterfowl</b>	River (mi)	282
	Lakes (acres)	60
	Estuary (sq. mi.)	-